IUCAA revisited

In September 1990, I had visited the Inter-University Centre for Astronomy and Astrophysics (IUCAA) when it was in the process of being set up as a resource centre for Astronomy and Astrophysics (A&A) in the university sector. The idea of setting up such a centre in the pleasant surroundings of the campus of the University of Pune was inspired by another major project in astronomy also being based there: the Giant Metrewave Radio Telescope of the Tata Institute of Fundamental Research.

Indeed, during this first visit, the wing of the TIFR managing the GMRT project (now named the National Centre for Radio Astrophysics) already had its buildings and, being next door to the up and coming IUCAA, had lent the latter its facilities. Thus the seminar which I went to attend was in fact held in the lecture hall of the NCRA. I recall being taken round the IUCAA site by its Director, Jayant Vishnu Narlikar who not only briefed me on the mandate of the budding inter-university centre, but also on how the buildings were being planned to achieve its aims and objectives.

To me it seemed a far extrapolation from the few activities which I saw, managed by a skeleton staff, to the full fledged institutional programme as envisaged in the ambitious project report written in 1988, the year the centre was founded. It was yet another extrapolation, from the chaos and bustle of the building construction then going on to the architectural masterpiece which was envisioned. I recall leaving for Bangalore with good wishes for this new experiment in the university sector, but also apprehensions as to its success.

A few months ago I had a chance of a second visit, now after a span of some six years. How do the vision and dreams compare with achievement and reality?

Campus

No visitor to this beautiful campus can deny that it is indeed a unique piece of architecture, where the imaginative use of spaces to promote mixing and interactions between the scientist users goes hand in hand with well-planned interiors, soothing landscaping and last but not the least, careful attention towards maintenance. A marked contrast to so many of our public institutions which are inaugurated with great fanfare but begin to decay from day one for lack of attention to such details. The director gave full credit to the architect and the various consultants and to his own colleagues for all this.

The IUCAA buildings are spread over three plots divided by two roads named after Meghnad Saha and Vainu Bappu, two Indian stalwarts in A&A. Akashganga has the staff colony and the recreation centre, Devayani houses the main office buildings and facilities of the Centre while Aditi has the Chandrasekhar auditorium and of course, the shed Aditi where the IUCAA had started its activities in 1989. The different blocks in Devayani are named after Indian astronomers of an earlier age, Aryabhata, Varahamihira, Brahmagupta and Bhaskara (see *Curr. Sci.*, 1990, **59**, 962–964).

While going round these blocks, I came across one named 'Ballava'. Who was Ballava, I asked. Jayant explained that it was the name assumed by Bhima when he went incognito in the court of Virata in the Mahabharata saga, when he played the part of the chef in the royal house. Aptly the name is given to the IUCAA canteen block! Inside the canteen one sees a sobering quotation which would bring any astronomy researcher back to earth: The discovery of a new dish does more for human happiness than the discovery of a star. Predictably, the quotation is from Brilliant-Savarin, a great chef.

Exhibits

A speciality of the campus is the integration of the architecture with scientific exhibits. Thus the centrepiece of Devayani is the Kund which has four statues, of Aryabhata, Galileo, Newton and Einstein. Behind Aryabhata, appropriately, is the entrance to the Aryabhata block with the centrepiece of the Foucault Pendulum. In his shloka in *Aryabhatiya*, Aryabhata had stated that the Earth spins about an axis and hence the fixed stars appear to move in the westerly direction. The Foucault pendulum reminds astronomers that the Earth's spin relative to an inertial frame can be measured without recourse to the stars. Newton's statue has an apple sapling specially gifted by the Brogdale Horticultural Trust: it is a plant whose ancestry can be traced to the orchard in Newton's home, the Woolsthorpe Manor.

At the centre of the Kund itself is a representation of what radio astronomers would identify as a radio source with accretion disc and jets coming out of the central compact region.

The guest house cum hostel is called Nalanda and its courtyard has the Sierpinski gasket landscaped. . . a fractal figure of Hausdorff dimension 1.58 approximately. The smallest of the three principal courtyards has two banyan trees which symbolize a binary star system whose Roche lobes and Lagrangian points are well identified.

Across the Meghnad Saha road, within the foyer of the auditorium is the aperiodic tiling whose mathematical features were highlighted in Roger Penrose's book *The Emperor's New Mind*. Under construction outside is a replica of the Hampton Court Maze whose walls are made of hedges. It is an excellent practical exercise in the connectivity of figures. Indeed there are plans to develop the outside areas into a science park. A replica of the Samrat Yantra already dominates this area.

The astronomical pictures gifted by David Malin adorn the walls on the first floor of Aryabhata while Ashwin Mehta's photographs grace the ground floor. There are the occasional wall paintings like the Lorentz attractor and Glashow's snake to which more may be added in due course.

Facilities

The IUCAA was designed to provide facilities to university academics which will help raise their productivity in A&A both in quality and quantity and provide them with new avenues of research. The excellent library, computer centre with worldwide access on the networks, the data centre which can tap on-line databases, the instrumentation

laboratory which provides opportunities and guidance in do-it-yourself instrumentation in the astronomical field are housed in the north-east corner of the Devayani compound, around the smallest of the three courtyards.

The visitors need housing which is provided in the Nalanda Guest House and the Takshashila apartments. University faculty and students, participants of workshops and training programmes as well as experts from outside are housed here. With a commuting distance of less than a hundred metres to work, and the fact that academic work can go on in principle at any time of the day or night, the visitors should have no cause for complaint!

Programmes

In the project report, the IUCAA had projected its activities along an 'eightfold way', involving simultaneous attacks on several fronts. Even when I had first visited, these activities were initiated despite small and inadequate infrastructure. IUCAA's academic calendar is published around June every year and it makes impressive reading. Apart from its own inhouse graduate school, the IUCAA faculty are guest lecturers in the astrophysics M Sc stream of the Pune University Physics Department. There are a number of schools and workshops throughout the year, ranging from the introductory to the frontier level both at the IUCAA campus and in different universities.

Thanks to its guest observing programme, IUCAA has been able to involve university academics in optical astronomy in India and abroad. Encouraged by the response and anticipating growth in the coming years, a 2-metre class telescope has been ordered with the Royal Greenwich Observatory, UK and it should be operational well before the end of this century.

The IUCAA has been getting more and more university departments interested in including A&A as a special subject in the Physics or Mathematics M Sc programmes. Thus a model syllabus has been framed in a modular form which can be adapted to the system prevailing in any particular university.

The culture of instrumentation has been catching up, thanks to the projects initiated by the instrumentation laboratory. I saw a prototype 14-inch automated photoelectric telescope being fabricated. It is being duplicated by a team from Bangalore University. Hopefully, other universities will follow this example.

There are other smaller projects relating to detectors. There are more ambitious proposals for sophisticated instruments to go with the IUCAA telescope. It is hoped that the universities will be involved along with IUCAA in these.

As a part of efforts to mobilize human resources in A&A, science popularization forms an important programme of IUCAA. In 1991, IUCAA convened a national meet of amateur astronomers. This proved to be a catalytic activity which set the pattern for future such meets convened annually in different parts of the country. Now the amateurs have formed a national confederation of different clubs. In addition, workshops for making telescopes and sky globes by IUCAA have proved popular.

An important feature of all such programmes is IUCAA's involvement with school children through lectures and summer projects. The lecture demonstrations in English, Marathi and Hindi in the IUCAA's Chandrasekhar auditorium on the second Saturday of the month are oversubscribed. In the summer vacations, over 100 children from Pune schools spend a week each at IUCAA doing some astronomy-related project with a staff member. From research students to the director, all members participate in this programme actively.

Achievements

Thus great care has gone into the planning and management of this centre and its academic programmes. This brings me to the basic question: Has the idea of such a centre worked? Are the aims and objectives of the centre given in the project report being fulfilled? There is no doubt that the work done at IUCAA is already beginning to be known internationally. The response to IUCAA's post-doctoral programme, the participation of its academics in its international programmes and conferences, and the flow of reputed scientists to the centre's academic activities have all been very encouraging.

But how about its impact on the university scene? Here the achievements have been admittedly mixed. The general feeling was that the associateship programme has helped uplift the work of some twenty per cent of the participants, while for another twenty per cent the improvement may show in another three to four years. Why are these percentages low? The reasons are many.

The university system has its own inertia. Despite exhortations to the vice-chancellors by the successive Chairpersons of the University Grants Commission to look upon the Inter-University Centres as their own field stations, very few have been liberal enough to grant suitable leave facilities to the associates to enable them to come and visit IUCAA for their work. The numerous workshops and schools do help introduce new research topics to academics from the universities, but only a percentage of the above order have taken advantage of them. Perhaps IUCAA needs to adopt a more agressive and persuasive technique to bring about changes of attitudes.

The new project of the IUCAA telescope has great potential for encouraging the observational programmes amongst universities. There will be practical difficulties like the observer getting leave at the time when his or her programme is scheduled, the paucity of student-power in the universities, etc. These are challenges to be met.

Even before the completion of the GMRT project, a community of university users in radio astronomy has to be built up. Perhaps it is time for IUCAA and the NCRA to get together to formulate a strategy that will gradually induct the universities into using the GMRT.

What of the future?

Having visited the Inter Universtiy Consortium for DAE facilities (IUC-DAEF) some years ago (*Curr. Sci.*, 1995, **68**, 670–671), one could not help asking the same questions which came up in the context of that institution. A balance has to be struck between the service activities which form the primary mandate of the institution, and the quality of research by its own scientists. If the latter suffers, then it does affect the wider goal of quality work in

A&A at the universities. My own impression, which seems to agree with that of IUCAA's Director, is that the interaction with universities has been quantitatively as planned but its quality needs to be looked into – easier said than done. Looking at the impressive calendar, one does wonder whether there is a risk of spreading oneself too thin. In the early years, the activities were somewhat top-heavy (i.e. relativity and theoretical cosmology were over-represented), and even after later expansion into other areas, one wonders whether the observational, phenomenological and instrumentational sides of astronomy are fully taken care of. Of course, one could consciously stay away from them, since there are other astronomical institutions in the country, and in fact that would be better than some sub-critical activity for the sake of maintaining a presence.

Having congratulated IUCAA for its rapid progress in the last seven years, I may be forgiven some cautionary remarks, based on my experience with at least four institutions. The initial years are in some sense a honeymoon period, when novelty and excitement act to mask the precursors of the troubles ahead. A wise institution (or couple!) would do well to anticipate some of these. Scientists are by their very nature individualists and hard to weld into a team. In fact, the problem of getting faculty to pull together and respect and take part in collective decision making is widespread. The alternative, of relying on the energy, initiative, and judgment of a single personality, does not work forever! Given the overall goal of helping the university sector, some guidelines have to be laid down and followed, so that the burden of this task does not fall on too few shoulders. One must say that by and large, the structure and functioning of IUCAA have a degree of transparency which is rare elsewhere in the country.

Ultimately, the relation of IUCAA and the Universities has to evolve to become an equal one, based on mutual respect, rather than mutual need. One knows that the world's best radio telescopes, run by the National Radio Astronomy Observatory (NRAO) in the USA, come under an organization called Association of Universities for Research in Astronomy (AURA) which is no mere figurehead, but takes a lively interest and role in the functioning of the NRAO. The dilemma of both IUCAA and IUC-DAEF is that at the moment, such inspired guidance from the universities will not be forthcoming and they will have to play the role of a guide to their own future masters. Lest such terminology seem repugnant, let us remember that Jawaharlal Nehru described himself as 'the first servant of the Indian people'. Everyone will wish IUCAA success in the difficult role that it has taken up, of being the first servant of Astronomy and Astrophysics in the Indian Universities.

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